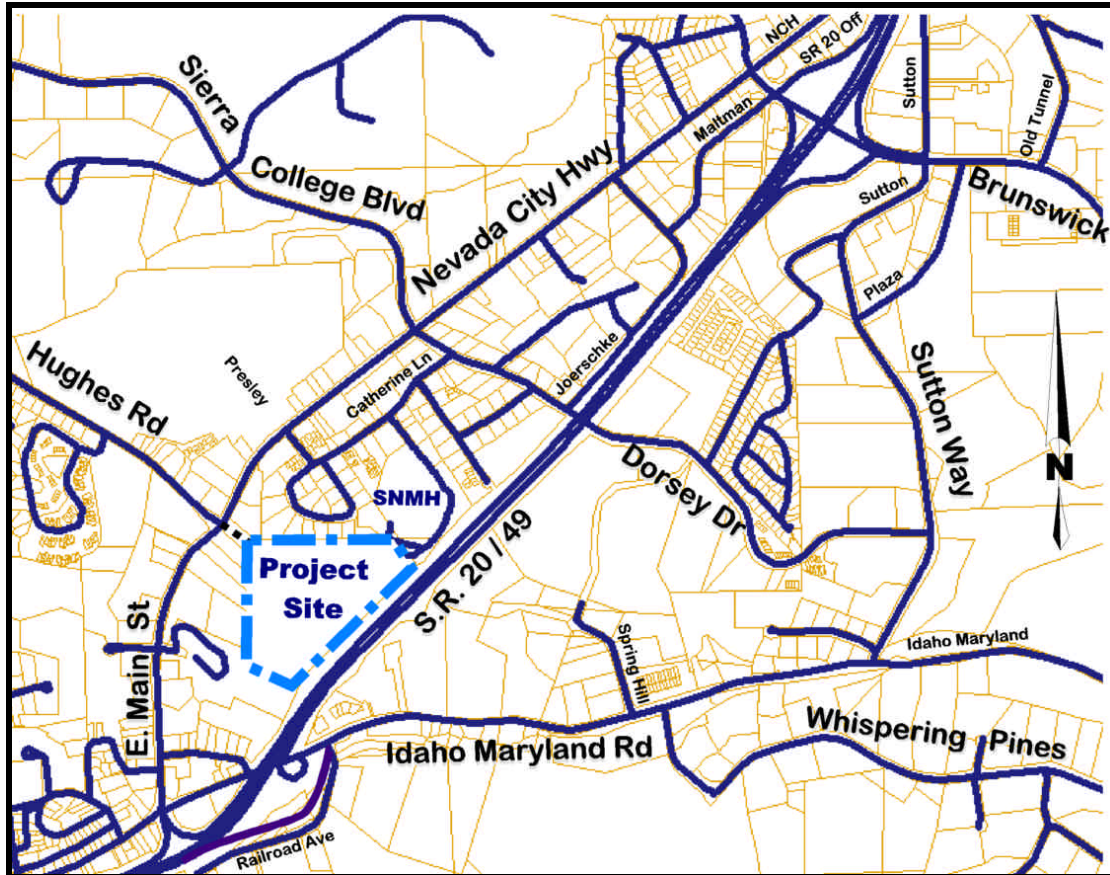


PRISM ENGINEERING



Sierra Nevada Memorial Hospital Expansion Final Draft Traffic Impact Study

Prepared for the Sierra Nevada Memorial Hospital under the
direction of the Nevada County Transportation Commission

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Executive Summary for SNMH Project (20,000 sq ft)

The Sierra Nevada Memorial Hospital (SNMH) Expansion Project is for development of 20,000 square feet of new medical office outpatient facilities with 32 employees. The project is expected to generate 504 daily trips, and 54 pm peak hour trips. During the am peak hour, the project is expected to generate 33 trips. Access to the project site will be via Catherine Lane, which then connects to Dorsey Drive on the north and Presley Way on the south. A new connector road to Hughes / East Main was examined, but will not be implemented with the 20,000 sq. ft. project (as it is not needed to relieve local traffic circulation), but is envisioned as a possible future improvement to SNMH access. The project traffic level has very little impact on the local immediate existing street system. However, several of the more remote study intersections are currently operating at LOS E/F conditions, and are sensitive to any increase in traffic. The intersection of Idaho Maryland and East Main Street would increase in delay from 69 to 73 seconds, an increase of 4 seconds, which is not acceptable and needs mitigation. The project can help mitigate some of these impacts as follows:

- **Idaho Maryland Road and East Main Street**

- *This location is currently in the CIP fee program (\$350k), and should be mitigated at or nearly after the time when project traffic further impacts this location. The project applicant can work with the City to ensure that the intersection gets mitigated in a timely manner. The project applicant's payment of the established mitigation fee mitigates the project's impact. The cost per calculated trip in the pm peak hour is \$527/trip. Since the project is estimated to add 54 new pm peak hour trips to the surrounding street system, the cost would be $\$527 \times 54 = \$28,458$ to be paid into the regional mitigation fee program.*

- **Idaho Maryland and SR 20/49 EB Ramps**

- *This location has been identified for improvement in the City of Grass Valley General Plan. Project to pay fair share, and help get a traffic signal installed.*



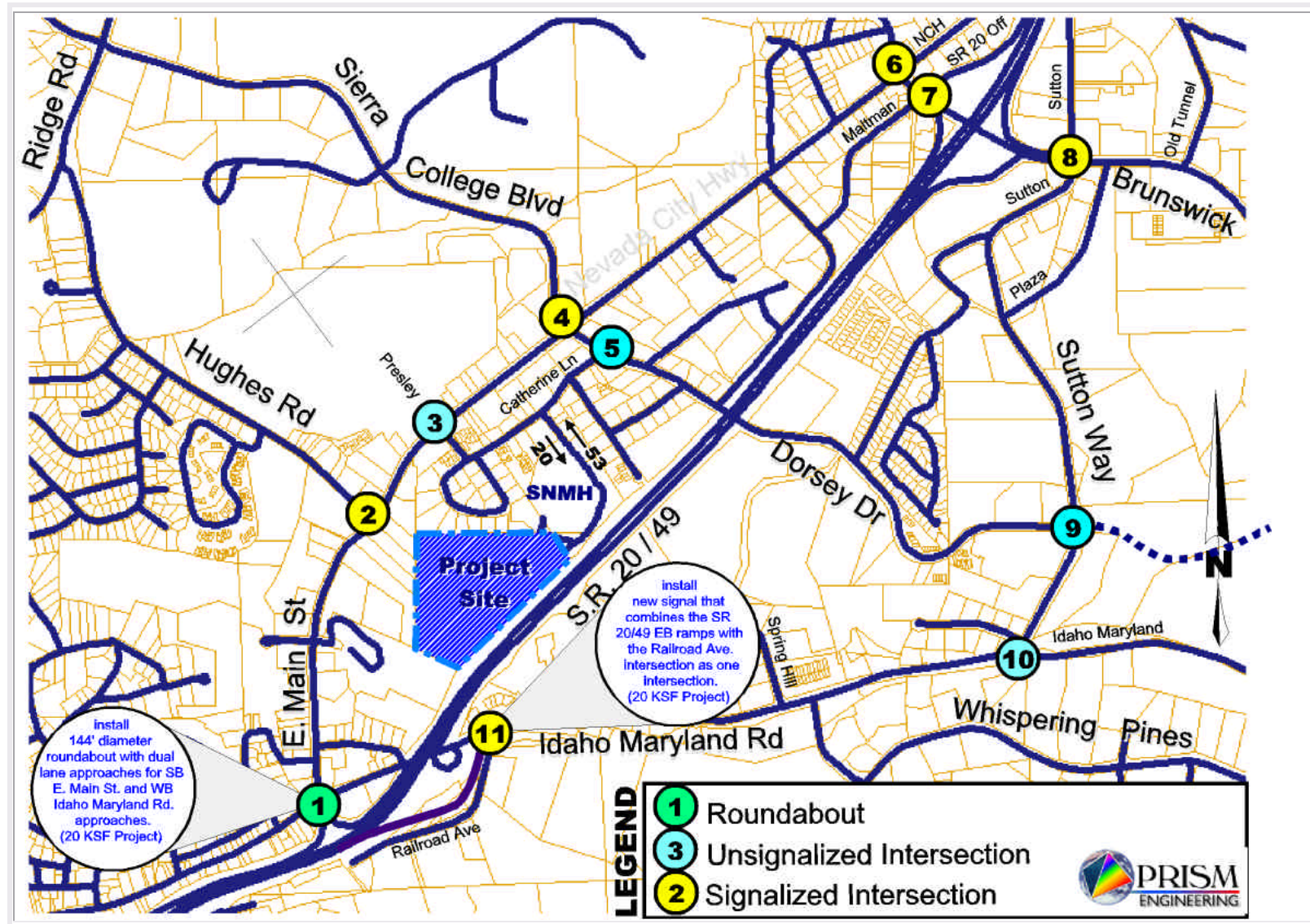


Figure ES.1 Proposed Project Mitigation Locations: Intersections 1 and 11



Introduction, Project Description, and Existing Setting

The intent of this traffic study is to establish and analyze existing and expected levels of traffic for a proposed 18 acre expansion to the property known as "Sierra Nevada Memorial Hospital" (SNMH). The "project" site is immediately adjacent to the already developed SNMH hospital, and this section of the traffic study examines the impacts from development of an initial project of 20,000 square feet of new outpatient medical facilities with 32 employees. The following scenarios are examined:

- 20 KSF Project impacts on existing traffic operations
- 20 KSF Project impacts to future levels of service.

PROJECT DESCRIPTION

The SNMH expansion is for local development of 20,000 square feet of outpatient imaging and women's center facilities, with 32 onsite employees. The SNMH 18 ac Master Plan indicates a potential of 80,000 square feet, but the proposed project is only for 20,000 square feet (a single one story building). This new development will take place on the 18 acres of land, adjacent to the SNMH hospital facilities that already exist at this location (see Figure 1A).

The new development will adjoin the existing development through a parking lot / access road connection as shown in Figure 1A. A new road connecting the newer parking lot will be constructed to prevent new traffic from having to traverse through the existing parking lot immediately north of the proposed site. There are 175 +/- spaces existing in the newer southerly lot (as shown in Figure 1B). An additional 125 +/- spaces will be constructed with the 20,000 square foot project adjacent to the proposed building.

All access to the project will be through the existing perimeter road of the SNMH hospital's internal parking lot system, which ultimately connects to Catherine Lane.





Figure 1A **Project Site Proposed Building and Parking Lot Detail**

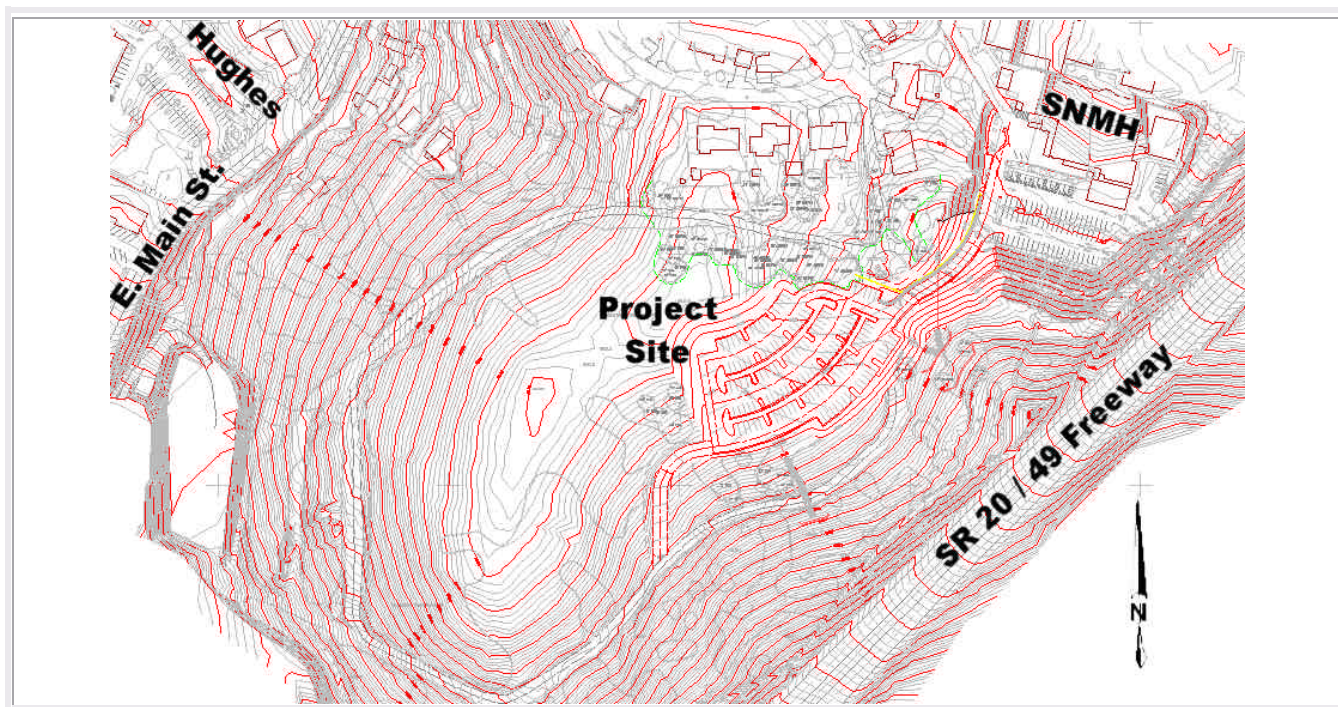


Figure 1B Existing Parking Lot and Land Topography Detail**EXISTING SETTING**

Figure 2 shows the location of the proposed project site (18 acres parcel south of and adjacent to existing Hospital site). The figure also shows the locations of the eleven study intersections examined in this report's analysis section. Signalized study intersections are depicted with a yellow circle, and unsignalized study intersections are shown in blue. Stop sign locations are also given for unsignalized study intersections.

The proposed project site is surrounded by a system of streets that includes a freeway system (the SR 20/ 49 Golden Center Freeway on the east side).

Street Segments

Catherine Lane and Presley Way: Phase 1 access to the project will be entirely via the existing Catherine Lane access to Dorsey Drive and Presley Way to E. Main Street (Nevada City Highway). These immediate access roads are two lane facilities with on-street parking.

Dorsey Drive: This existing two-lane roadway (with on-street parking in some sections) has significant plans for the future. Sometime around the Year 2006-2008, the Dorsey Drive interchange is planned for construction. When it is completed, it will serve as a regional mitigation to the street system, and some traffic patterns are expected to shift, utilizing the new interchange and relieving the Brunswick Basin as well as the Idaho Maryland interchanges with SR 20 / 49.

East Main Street (Nevada City Highway): This two-lane facility has a two-way left turn lane extant for most of its length from Idaho Maryland Road to Brunswick Road and beyond. There is currently one lane of travel in each direction, with some widening (additional lanes) at signalized intersections to provide additional capacity for left turns, etc. This road is a regional facility and carries about 12,000 vehicles per day south of Brunswick Road.

Brunswick Road: This major arterial carries approximately 29,000 vehicles per day over the bridge crossing the SR 20 / 49 freeway. To the east of Sutton Way volumes drop to approximately 13,000 ADT, indicating that



there is a lot of back and forth traffic over the bridge due to the availability of commercial retail and eating establishments on both sides of the freeway. The Brunswick Basin commercial area is the busiest area and carries the highest levels of traffic volume in the County.

Idaho Maryland Road: This two-lane road serves regional traffic as well as local traffic. The regional nature of traffic is due to its interchange with the SR 20 / 49 freeway. Traffic conditions in the vicinity of the freeway are currently at LOS E/F conditions for the pm peak hour. Traffic congestion relief for this roads intersection with East Main Street is a high priority with the local and regional planning agencies.

Hughes Road: This two-lane road connects East Main Street with Ridge Road, and serves residential pocket areas along the way. It is signalized with the East Main Street intersection, which is a three-way intersection with the possibility to expand with the advent of the SNMH expansion project.

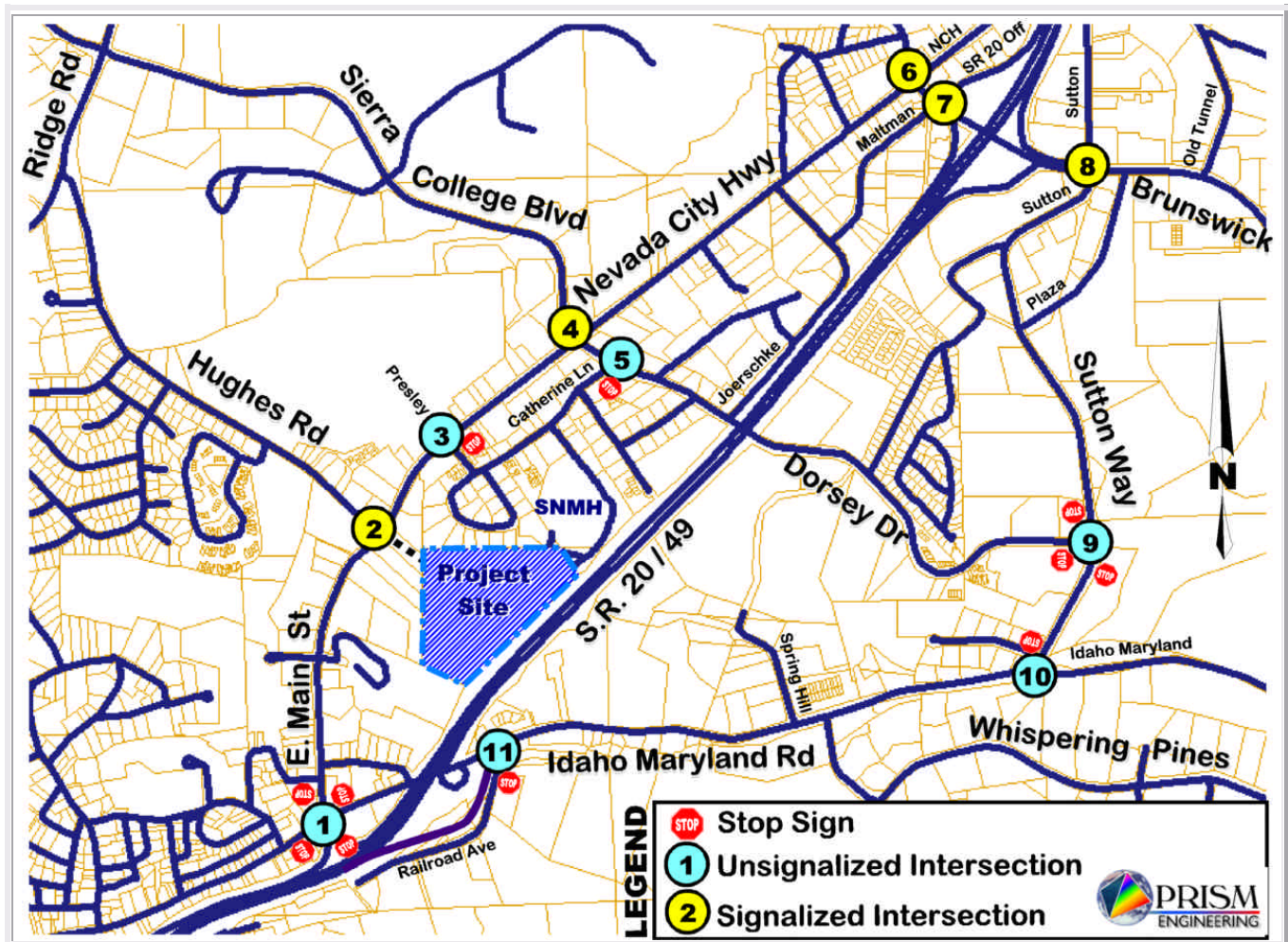


Figure 2 Vicinity Map, Project Site, and Study Intersections**Intersections**

Eleven intersections were studied in this report. Five of these locations are currently operating at or below LOS E conditions. The existing conditions at these locations are summarized in the following paragraphs.

- **Idaho Maryland Road and East Main Street**
 - *Operating at LOS E/F in pm peak hour. Can not be mitigated by installing signal, must be a roundabout installation to increase capacity and meter traffic onto freeway. City of Grass Valley is pursuing this mitigation, to accelerate installation in next year. Intersection is slated for improvement in the Regional Mitigation Fee programmed CIP.*
- **Brunswick Road and Nevada City Highway**
 - *Operating at LOS E in pm peak hour. Can not be easily widened or mitigated. Expected to get reductions in regional through traffic when Dorsey Drive interchange goes in (year 2006-2008).*
- **Brunswick Road and SR 20/49 WB Ramps / Maltman**
 - *Operating at LOS E/F in the pm peak hour. This intersection suffers due to the short distance (200') between ramps and the Nevada City Highway. Can be mitigated with additional lanes on off ramp and on ramp. This location is currently in the CIP fee program to add a left turn pocket to the off ramp (\$300k)*
- **Brunswick Road and Sutton Way**
 - *This location operates at LOS E/F in the pm peak hour, and can be modified to improve performance. This location has recently been identified for improvement in the Brunswick Corridor Study, but is not currently in the CIP fee program. Through the widening of Sutton Way north of Brunswick Road, and installation of additional left turn pocket lanes, mitigation can be achieved.*
- **Idaho Maryland and SR 20/49 EB Ramps**
 - *This intersection is combined with the Railroad Avenue intersection, and needs to be signalized as one intersection. The details of how this intersection would be configured require further study, but generally, a right in / right out configuration for Railroad Avenue would be necessary, or through separate signal phasing for left turns out is also possible. The impacts of such signal phasing on the operations of Idaho Maryland Road would require further study. This location has been identified for improvement in the City of Grass Valley General Plan*



Figures 3A, 3B, 3C, and 3D present photography of traffic geometry conditions at the various study intersections and street segments or approaches to the intersections. These figures are organized to correlate with Figure 2 which shows the various study intersection numbers. Photos shown in Figures 3A, 3B, 3C, and 3D are identified with an intersection number that correlates to the locations shown in Figure 2.

	
<p>Int#1: E. Main Street Looking South towards Idaho Maryland</p>	<p>Int#1: Looking East at Idaho Maryland from northwest corner with E. Main</p>
	
<p>Int#2 E. Main Street Looking North at Hughes Road</p>	<p>Int#2 E. Main Street Looking South at Hughes Road</p>





Int#2 Hughes Road Looking East
towards E. Main Street Intersection



Int#3 Looking East onto Presley Way
from E. Main Street

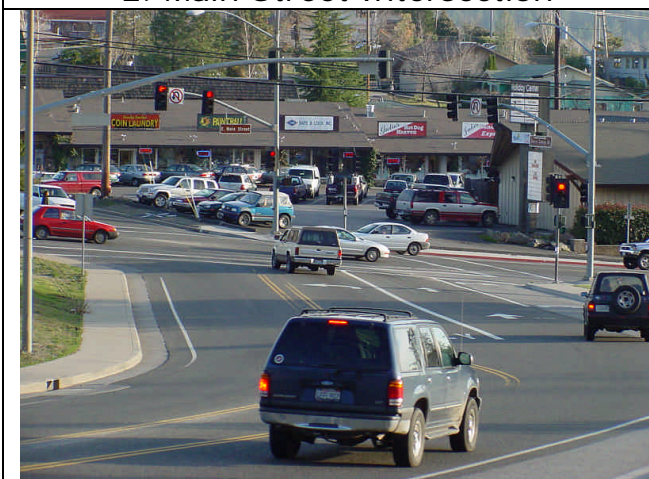
Figure 3A Study Area Intersection Approach Photos



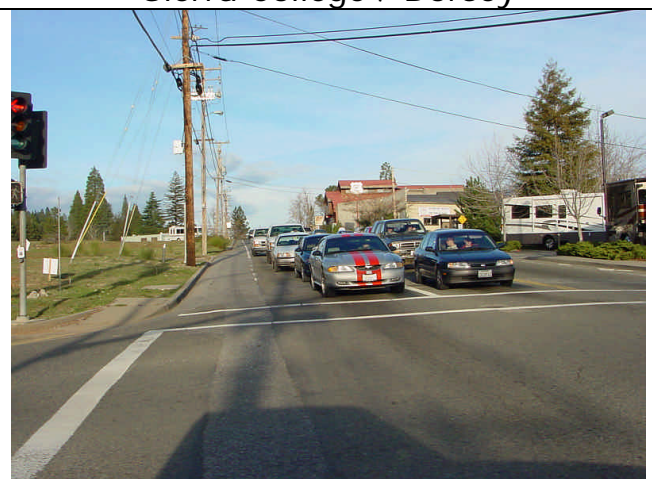
Int#4 Dorsey Dr. Looking West at
E. Main Street Intersection



Int#4 E. Main Street Looking North at
Sierra College / Dorsey



Int#4: Sierra College Blvd. Looking



Int#4: E. Main Street Southbound



<p>East towards E. Main Street</p> 	<p>Approach Lanes at Sierra College Blvd.</p> 
<p>Int#5 Dorsey Looking Westbound at Catherine Ln. Intersection</p>	<p>Int#5 Catherine Ln. Looking South from Dorsey Drive Intersection</p>

Figure 3B Study Area Intersection Approach Photos

	
<p>Int#6: Nevada City Highway Looking North to Brunswick Road</p>	<p>Int#6: Nevada City Highway Looking South to Brunswick Road</p>
	





Int#7: Brunswick Road Looking East at Maltman Drive	Int#8: Brunswick Road Looking West from Sutton Way Intersection
	
Int#8: Sutton Way Looking North at Brunswick Intersection	Int#9: Dorsey Drive Looking EB at Sutton Way Intersection

Figure 3C Study Area Intersection Approach Photos



	
Int#9: Sutton Way Looking North from Dorsey Intersection	Int#10: Sutton Way Looking South at Idaho Maryland Intersection





Figure 3D Study Area Intersection Approach Photos

Trip Generation and Distribution

The Institute of Transportation Engineers (ITE) Trip Generation Manual 6th edition contains data that describes various types of land uses similar to that being proposed in this project. Two such land uses may be applied in this case: Land Use 720 and Land Use 610.

Land Use 720 of this publication details the amount of traffic that can be expected on the average from Medical Office Building development for a wide variety of independent factors including square footage and employees. Land Use 720 of the ITE Trip Generation Manual introduction for Medical-



Dental Office Building reads: "A medical-dental office building is a facility that provides diagnoses and outpatient care on a routine basis, but is unable to provide prolonged in-house medical and surgical care. This type of facility is generally operated by one or more private physicians or dentists." This particular trip rate for the pm peak hour has over 40 samples or surveys, building a high degree of confidence in the average trip rate. In this proposed project, the expansion of the hospital site will include 80,000 new square feet of various outpatient imaging and women's center facilities. The same is true for Land Use 610 which details trip generation data for Hospitals.

Land Use 610 has the following description: "A hospital is any institution where medical or surgical care and overnight accommodations are provided to non-ambulatory and ambulatory patients. The term "hospital" does not, however, refer to medical clinics (facilities that provide diagnoses and outpatient care only) or to nursing homes (facilities devoted to the care of persons unable to care for themselves)..."

Both of these trip rates are seemingly applicable to the project, as the project is both a hospital and also has outpatient facilities, all of which share the same entrance road (Catherine Lane). However, the trip rates for Land Use 720 and 610 differ significantly with Land Use 720 averaging three to four times higher as seen in the following table:

**Table 1A, Trip Generation Comparison
Between Land Use 720 and 610**

	Land Use 720 based on Square Footage	Land Use 610 based on Square Footage	Land Use 720 based on No. of Employees	Land Use 610 based on No. of Employees
Trip Rate	3.66/KSF	0.92/KSF	1.06/EMP	0.29/EMP

Source: ITE Trip Generation 6th edition, and PRISM Engineering

Table 1A illustrates the dilemma in determining which trip generation rate to use in this study (they differ significantly), but both seem to be applicable as there are both hospital facilities and outpatient care facilities on the existing Sierra Nevada Memorial Hospital site. To be exact, there is a total of 175,000 square feet of facility broken down as follows:

- 106,700 square feet of "hospital" land use
- 68,300 square feet of "outpatient care" land use.



In an initial study of the proposed 20,000 square foot expansion it was determined that there would only be 32 employees staffing this facility. Depending on which independent factor was used in calculating trip generation for the project (employees versus square footage of building), a different answer was obtained:

**Table 1B, Trip Generation Comparison
Between Square Footage and Employees**

	Land Use 720 based on Square Footage	20,000 sq ft	Land Use 720 based on No. of Employees	32 employees
Trip Rate	3.66/KSF	73 trips	1.06/EMP	34 trips

Source: ITE Trip Generation 6th edition, and PRISM Engineering

A conservative approach would be to utilize the trip rate the yielded the higher number of trips, but this is not necessarily fair to the project. The project applicant was desirous that more data be collected to further investigate the actual trip generation taking place at the existing SNMH facility. This method, if financially feasible, is actually the best method of any as it precisely documents what is taking place rather than use an average of facilities all over the United States. Since the SNMH is proposing expanding their existing facility, it is entirely appropriate to determine what their existing trip generation is, and then project future traffic from that.

Marks Traffic Data Services was hired to take an independent trip generation study to collect traffic counts at all locations entering into the SNMH facility. The days of Tuesday, Wednesday, and Thursday were selected as being typical days on which to collect data. Data was collected each and every hour beginning on April 1 and ending April 3 for an entire 72 hour period. PRISM Engineering received the data and summarized that an average of 288 vehicles entered/left the SNMH campus during the pm peak hour (4:00 to 5:00 pm). The range of traffic for the three days was a low of 252 trips and a high of 316 trips. This independent survey presented solid traffic generation data for the SNMH hospital which could then be correlated with the ITE trip rates. The correlation, explained in the text that follows, helps determine how best to use the ITE trip generation data as it relates to the proposed outpatient care type of expansion.

Development of Specific SNMH Trip Rate



The hospital and outpatient center currently occupy 175,000 square feet, but the trip generation counts (316 pm peak trips, worst case) indicated that the trip rate for land use 720 (3.66 trips/KSF) was more than double than the count: 641 trips compared with 316 trips. This is due to the fact that the count represents some kind of "average" between the hospital and outpatient facilities, which generate different traffic patterns. If the trip generation rate for a Hospital (land use 610 at 0.92 trips/KSF) is used, then the trip generation is about half of the count: 161 trips compared with 316 trips.

Similarly, the same correlation is made with the independent variable being number of employees rather than square footage of the building. However, if the existing facility is evaluated based on its two distinct uses: The hospital inpatient facility and the outpatient center, a match between the traffic counts and ITE Trip Rates can be achieved.

There are a total of 650 employees at the facility with 532 assigned to the hospital and 118 to the outpatient center. The total floor area of the facility is 175,000 square feet, with 106,700 square feet in the hospital and 68,300 in the outpatient center. If the average trip rates based on employees for land uses 610 and 720 are used the resulting total (279) is lower than the average of the 3 pm peak hour counts (288) but higher than the lowest count (252).

**Table 1C, Trip Generation Averaging by Employees
for both Hospital and Outpatient Care Facilities, PM Peak
Hour**

Basis:	Average Trip Rate	Total PM Peak Trips
Hospital Employees	Land Use 610	
532	0.29/EMP	154
Outpatient Employees	Land Use 720	
118	1.06/EMP	125
Total Employees		
650		279

Source: ITE, and SNMH

When the average trip rates based on square footage are used the total (348) is higher than both the average of the 3 pm peak hour counts (288) and the highest count (316).



Table 1D, Trip Generation Averaging by Square Footage for both Hospital and Outpatient Care Facilities, PM Peak Hour

Basis:	Average Trip Rate	Total PM Peak Trips
Hospital Square Feet	Land Use 610	
106,700	0.92/KSF	98
Outpatient SQ FT	Land Use 720	
68,300	3.66/KSF	250
Total Square Feet		
175,000		348

Source: ITE, and SNMH and PRISM

When the trips projections based on employees and square feet of floor area for the two land use types are averaged together, the projected trips (314) very closely match the highest daily pm peak hour count (316).

Table 1E, Trip Generation Averaging for Both Employees and SQ FT for both Hospital and Outpatient Care Facilities, PM Peak Hour (average of Table 1C and 1D)

Trip Generation by Square Footage	Trip Generation by Employees	Average Trips
Hospital SQ FT (Land Use 610)	Hospital Employees (Land Use 610)	
98	154	126
Outpatient SQ FT (Land Use 720)	Outpatient Employees (Land Use 720)	
250	125	188
TOTAL		314

Source: ITE, and SNMH and PRISM

To further support the use of an averaged trip rate, the size and number of employees for the proposed outpatient facility (20,000 sq. feet, 32 employees = 625 sq. feet/employee) correlates fairly closely with the size and number of employees in the existing outpatient center facilities (68,300 sq. feet, 118 employees = 578 sq. feet/employee).



Using the averaged trip rate for Land Use 720 to determine the number of trips for the new outpatient facility yields a projection of 54 pm peak hour trips.

**Table 1F, Trip Generation Projection for Project
Based on Average Trips from Employees and Gross Square
Footage**

Trip Generation by Square Footage	Trip Generation by Employees	Sum of Trips
Outpatient SQ FT (Land Use 720)	Outpatient Employees (Land Use 720)	
20 x 3.66 = 73	32 x 1.06 = 34	107
Average Trips TOTAL		54

Source: ITE, and SNMH and PRISM

Table 1 documents the composite average trip generation rate utilized for the 20,000 square foot Project analysis using ITE Land Use 720 trip rates. The trip rates for employees and square footages were averaged together to develop the composite trip rates for am, pm and daily totals.

Trips are based on ITE national averages for similar type facilities as the project. The peak hour trip rates listed in the table represent the amount of traffic that is expected to take place to and from the project site during the adjacent street peak hour (ie 4:30 to 5:30 pm). The am peak hour is also shown in the table for comparative purposes; however, an am peak hour analysis was not included in this study. The pm peak hour impact is significantly higher than the am peak hour (54 pm peak hour trips versus 33 am peak hour trips). For this reason, the pm peak hour is the focus of this report's analysis.

During the pm peak hour, the average trip rate from the ITE Trip Generation Manual, 6th edition, is 3.66 trips per thousand square feet (KSF), and 1.06 trips per employee. Using the averaging of the two rates multiplied by the two independent variables (ksf and emp), this would correlate to a total of 54 pm peak hour trips, with 15 inbound trips during that hour, and 39 outbound trips during the same time period. There would be 504 daily trips for the new 20,000 sq ft expansion.



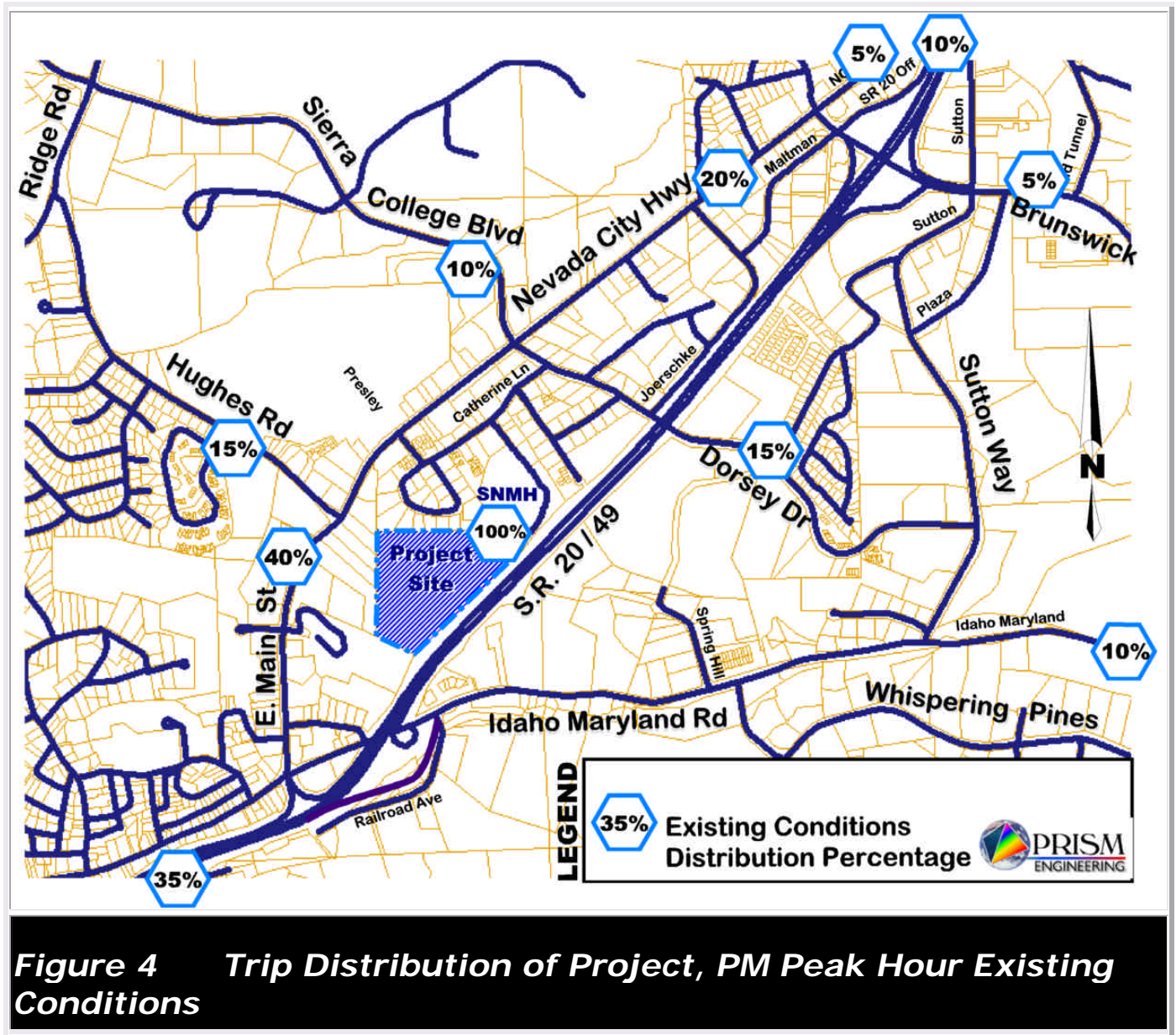
**Table 1G, Trip Generation for Project
(20,000 SQ FT building only)**

Medical Offices Expansion Summary						
AM PEAK HOUR (one hour between 7 and 9 am)						
ITE Code	Land Use	AM Peak Rate	Quantity	AM Peak Trips	AM Trips IN	AM Trips OUT
720	AM Rate for Medical Office in ITE Trip Generation Manual	2.43 trips / KSF	20 KSF	49	39	10
		0.53 trips / EMP	32 employees	17	13	4
AVERAGE TRIPS>>				33	26	7
PM PEAK HOUR (one hour between 4 and 6 pm)						
ITE Code	Land Use	PM Peak Rate	Quantity	PM Peak Trips	PM Trips IN	PM Trips OUT
720	PM Rate for Medical Office in ITE Trip Generation Manual	3.66 trips / KSF	20 KSF	73	20	53
		1.06 trips / EMP	32 employees	34	9	25
AVERAGE TRIPS>>				54	15	39
DAILY TRIP TOTALS						
ITE Code	Land Use	Daily Rate	Quantity	Daily Trips	Daily Trips IN	Daily Trips OUT
720	Daily Rate for Medical Office in ITE Trip Generation Manual	36.13 trips / KSF	20 KSF	722	361	361
		8.91 trips / EMP	32 employees	286	143	143
AVERAGE TRIPS>>				504	257	257

Source: ITE Trip Generation Manual and PRISM Engineering



For existing plus project conditions (before Dorsey interchange is built) the project traffic was assigned using the trip distribution percentages shown in Figure 4.



ANALYSES

Existing, Existing plus Project Conditions Analysis

A traffic count was taken by PRISM Engineering on August 28, 2002 at the intersection of Idaho Maryland Road and East Main Street for the pm peak hour conditions. Other sources of intersection count data included Year 2002 traffic counts previously taken and assembled by Caltrans for each of the study intersections in conjunction with the Dorsey Drive interchange studies.

Traffic count data is contained in the appendix of this report in tabular format for each of the eleven study intersections, for each of the analysis scenarios, including, Existing conditions, Existing plus Approved Projects conditions, Existing plus Approved Projects plus Hospital Expansion Project. In addition, all calculations are also summarized in the appendix for each scenario.

Figure 5 shows the study area intersections and how the project traffic was assigned using the distribution shown in Figure 4 for the Project traffic.

All of the project traffic was assigned to gain access through Catherine Lane, with the same overall trip distribution percentages shown in Figure 4.

A capacity analysis for signalized intersections was performed for the following scenarios:

- Year 2002
- Year 2002 plus Approved Projects
- Year 2002 plus Approved Projects plus 20 KSF Project

All intersection levels of service are measured in terms of volume to capacity, and a corresponding rank of level of service as follows:

LOS A < 0.60
LOS B >0.60 and < 0.70
LOS C >0.70 and < 0.80
LOS D >0.80 and < 0.90
LOS E >0.90 and < 1.00
LOS F >1.00



Table 3 summarizes what the level of service would be at a signalized or unsignalized intersection given varying degrees of delay to motorists.

Table 3
Delay Level of Service Criteria

LOS	Unsignalized	Signalized
A	1-10 seconds	1-10 seconds
B	11-15 seconds	11-20 seconds
C	16-25 seconds	21-35 seconds
D	26-35 seconds	36-55 seconds
E	36-50 seconds	56-80 seconds
F	51+ seconds	81+ seconds

Source: PRISM Engineering, Synchro Pro, and HCM



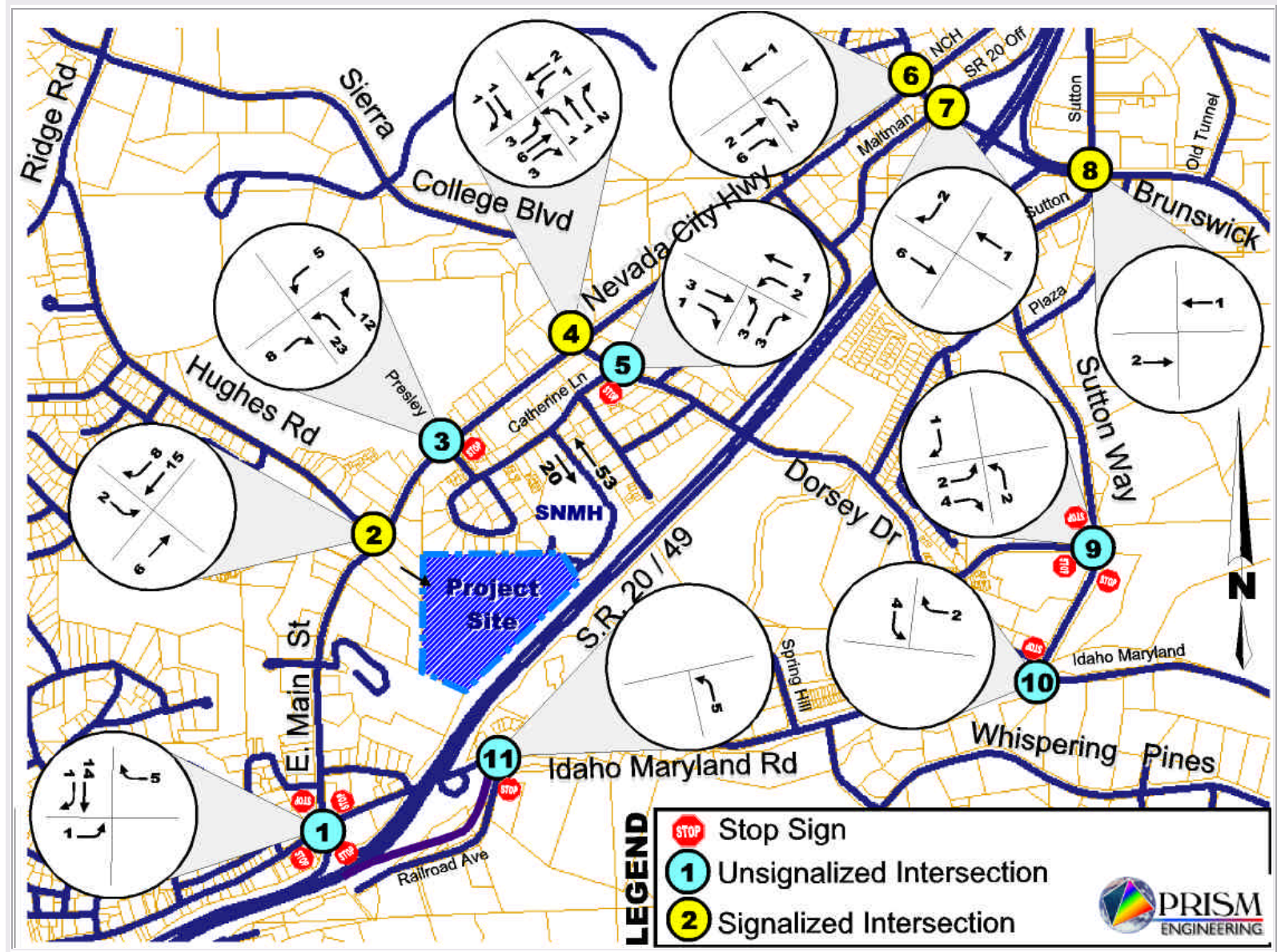


Figure 5 20 KSF (32 EMP) Project Traffic, PM Peak Hour, No Dorsey Interchange



Capacity Analysis Results

The details of the results for the Year 2002 analyses scenarios are summarized in Table 4. As can be seen from Table 4, several locations (five) are currently operating at LOS E or F conditions (using the Highway Capacity Manual (HCM) methodologies). It should be noted that while the HCM reports a very conservative rank for LOS, it is possible to mitigate specific intersection LOS with proper signal timing, if a signal is installed.

The HCM software usually provides the worst case conservative level of service as a general rule, however, signal installations can be customized to provide signal green time scenarios specific to times of day, traffic flow patterns, and volume of traffic. It is not unusual, for example, for an intersection to calculate at LOS E or F conditions for a signalized intersection, and yet be possible to get the intersection operate at LOS D conditions in the field if proper lane utilization takes place with a well designed signal timing software program (based on actual traffic counts and operations studies), so that no green time is wasted in actual operation. This will help keep traffic moving at its most efficient levels. The experience of the County in the Brunswick Basin vicinity, for example, has been that since the signal systems are coordinated with the Caltrans freeway ramp intersections, that optimization of County intersections may be compromised to keep the freeway ramp traffic moving at peak efficiency. Even so, the HCM method provides a conservative buffer in estimating LOS for planning purposes, as traffic volumes can fluctuate up or down 10-20% on any one day. Traffic volumes are not a constant occurrence at an intersection. Different days usually brings slightly different traffic volumes, as much of the traffic flow tends to be random in nature.

The LOS ranking shown in each of the tables are based on the HCM delay criteria summarized in Table 3.

Table 4 reports the existing conditions scenarios, and shows that according to the HCM analysis methods, five intersections are currently operating at LOS E/F conditions. This means that mitigation at these intersections is a priority as development projects come on line.



Table 4
Intersection Level of Service Analyses Summary for
Year 2002 PM Peak Hour Scenarios

		2002 + AP +				MITIGATED				
No.	Intersection Street Names	2002		2002 + AP		20 ksf Project		2002+AP+20 ksf Project		Mitigation Detail
		P.M. Peak Hour		P.M. Peak Hour		P.M. Peak Hour		P.M. Peak Hour		
		Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	
1	E. Main Street and Idaho Maryland Rd	66	F	69	F	73	F	13	B	Roundabout, 144' diam
2	E. Main Street and Hughes Rd	18	C	18	C	18	B			
3	East Main Street and Presley Way	4	A	4	A	13	A			
4	East Main Street and Sierra College Blvd	20	C	22	C	22	C			
5	Dorsey Drive and Catherine Lane	12	B	12	B	12	B			
6	Nevada City Highway and Brunswick Rd	69	E	69	E	69	E			
7	Brunswick Rd and SR 20/49 WB Offramp	96	F	99	F	101	F			
8	Brunswick Rd and Sutton Way	84	F	94	F	94	F			
9	Dorsey Drive and Sutton Way	11	B	13	B	13	B			
10	Idaho Maryland Rd and Sutton Way	11	B	13	B	14	B			install new Signal
11	Idaho Maryland Rd and SR 20 EB Offramp	137	F	139	F	147	F	12	B	

¹Average delay per vehicle in seconds

LOS = Level of service

Source: SynchroPro Software output, based on City's traffic volumes and projections (see appendix)



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Mitigations

Two mitigations are needed to bring the street network up to satisfactory levels of service with the impacts of the project. The Idaho Maryland / East Main Street intersection is one of the most critical locations to be mitigated for the project to be successful. With current peak hour conditions at LOS E/F, it would need to be mitigated at or near opening day of the project, since the majority of the project traffic would utilize this intersection. The Nevada County Transportation Commission and City of Grass Valley are currently studying installation of a roundabout at the East Main Street / Idaho Maryland Road intersection. Figure 6 shows the most likely configuration of a roundabout for this location.

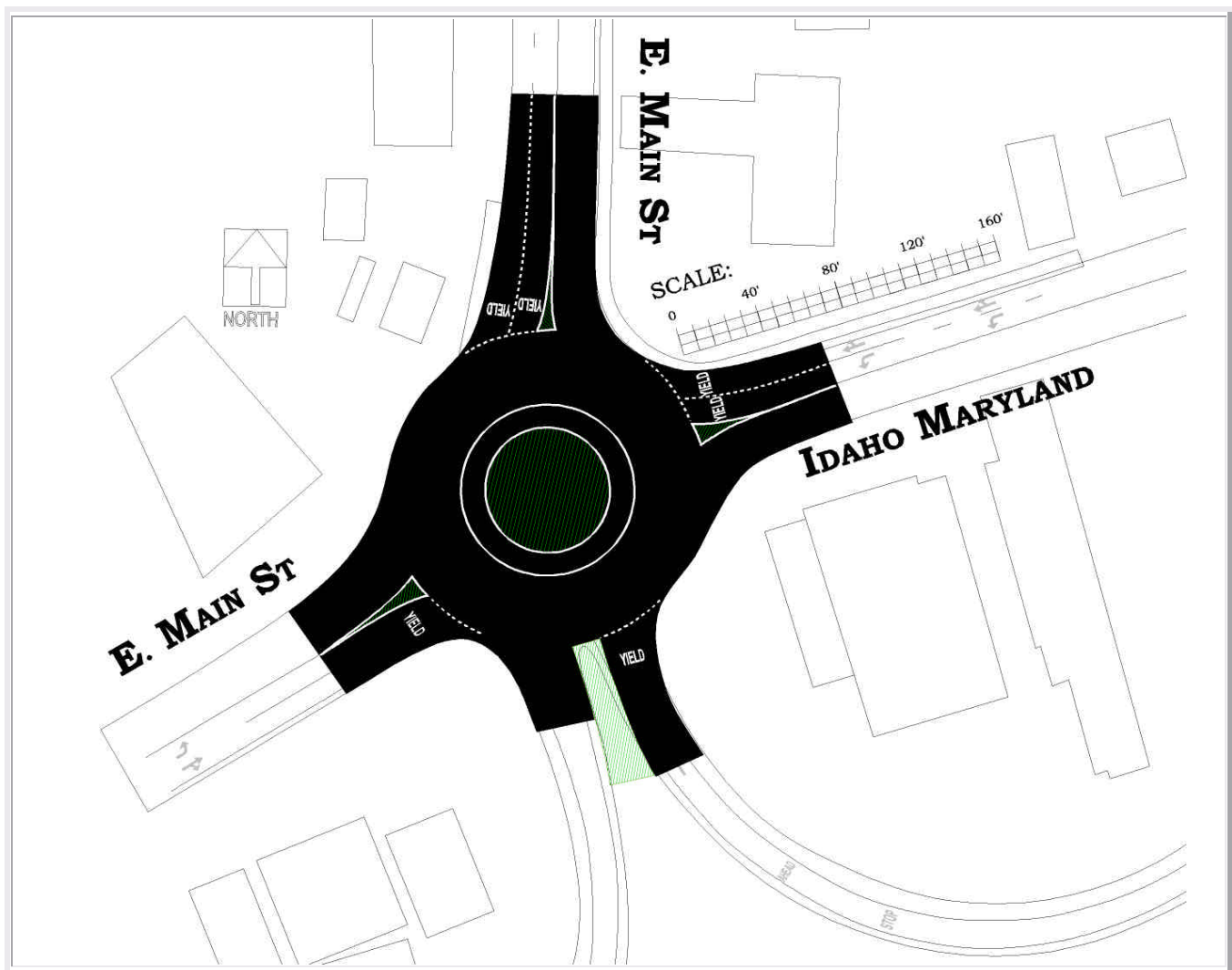


Figure 6 E. Main Street / Idaho Maryland Road Proposed Roundabout

\$350,000 has been allocated to this intersection in the Regional Mitigation Fee program. The City of Grass Valley is actively pursuing the installation of this needed mitigation. Payment of fair share fees into the regional mitigation fee program will cover this mitigation, but the project applicant should work with the City to ensure the timely implementation of this improvement.

The project's mitigation fee can be calculated using the current mitigation fee schedule for the urban area (Zone 8) in Nevada County (where the project site exists). The cost per calculated trip in the pm peak hour is \$527/trip. Since the project is estimated to add 54 new pm peak hour trips to the surrounding street system, the cost would be $527 \times 54 = \$28,458$ to be paid into the regional mitigation fee program.

Other locations that need mitigation but are not a part of the regional mitigation fee program include:

- **Idaho Maryland and SR 20/49 EB Ramps**

- *This location has been identified for improvement in the City of Grass Valley General Plan. The project significantly impacts delay to this location and will need to pay its fair share towards the installation of a signal system that will combine the SR 20/49 ramps with Railroad Avenue. Possibly a multi-phase signal to allow for separate access to Idaho Maryland Road by ramps and Railroad Avenue separately. This may cause too much delay to Idaho Maryland Road, and further study is needed to determine the precise configuration of the intersection. At the very least, a signal is needed to allow side street traffic access to Idaho Maryland Road.*

Each of these intersections are currently operating in the LOS E-F range during the pm peak hour time period. The locations and needed mitigations are summarized on Figure 7. Since the intersection of Idaho Maryland and SR 20/49 EB ramps is not in the regional mitigation fee program, the project applicant will need to work with the City to determine its fair share towards mitigation of this intersection in the short term.



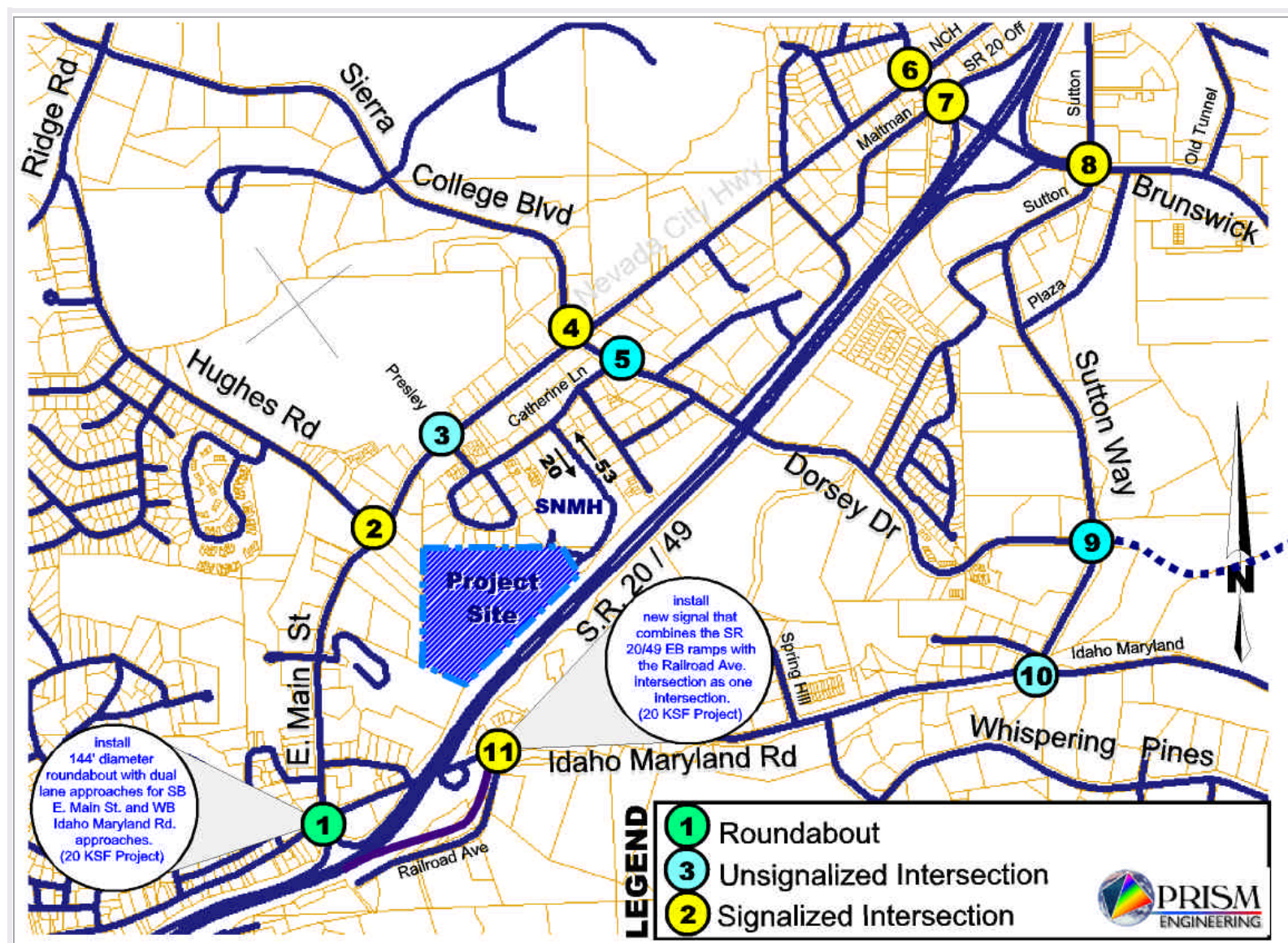


Figure 7 Mitigation Summary for 20 ksf Project Conditions



Executive Summary for SNMH 18 ac Master Plan Concept

The Sierra Nevada Memorial Hospital (SNMH) 18 ac Master Plan includes potential development of an additional 60,000 square feet of medical office outpatient facilities, above and beyond the initial 20,000 square foot project.

The Total 18 ac Master Plan is expected to generate 2016 daily trips, and 216 pm peak hour trips. During the am peak hour, the project is expected to generate 132 trips. The 18 ac Master Plan shows access to the new development site will be via Catherine Lane, and a new connector road to Hughes / East Main, as can be seen in Figure 8. This new connector is envisioned as a possible future improvement to SNMH access, as Dorsey Drive increases in traffic volume with the opening of the planned Dorsey Drive interchange in 2008. The total traffic projections from the 18 ac Master Plan would have significant impact on the street system. However, any development of the remaining Master Plan concept is not envisioned until after the Dorsey Drive interchange is installed, to both accommodate increased traffic volumes as well as provide relief to the surrounding street system. Once the Dorsey Drive interchange is installed, traffic volumes in the Brunswick Basin and Idaho Maryland areas are expected to decrease (10-20%) due to the shifting to traffic patterns in the future. The following locations will benefit from the Dorsey Drive interchange installation. Any future impacts by the SNMH 18 ac Master Plan, if developed in the future, can be mitigated by participation in the regional mitigation fee program.

- **Brunswick Road and Nevada City Highway**

- *This location will be mitigated to LOS D in the future by reduced volumes due to Dorsey Drive interchange installation. No short term mitigation is needed, as Dorsey is expected to mitigate this location.*

- **Brunswick Road and SR 20/49 WB Ramps / Maltman**

- *This location is currently in the CIP fee program (\$300k). SNMH Master Plan, when and if developed in the future, to pay fair share into regional mitigation fee program.*

- **Brunswick Road and Sutton Way**

- *This location has recently been identified for improvement in the Brunswick Corridor Study, but is not currently in the CIP fee program. SNMH Master Plan, when and if developed in the future, to pay fair share into regional mitigation fee program.*



Each of these locations are currently operating in the LOS E-F range during the pm peak hour time period. The locations and needed mitigations are shown on Figure ES.2. Development of the remaining SNMH 18 ac Master Plan will add impact to these locations, further aggravating the condition. Several mitigations have already been identified for these locations in previous traffic studies, so that for these locations, any future development of the SNMH 18 ac Master Plan would need to pay its fair share to the Regional Mitigation Fee program.

In addition, development of the entire SNMH 18 ac Master Plan would need to mitigate two other local intersections as follows:

- **East Main Street and Hughes Road Intersection Expansion**

- *This location is not in the CIP, and will need to be modified to accommodate a new road (westbound approach) extending Hughes Road into the project site. In addition, the southbound approach's two lanes need to be expanded to three lanes (modified from a thru and a right, to a left and a thru and a right installed with construction of entire SNMH Master Plan.*

- **Dorsey Drive and Catherine Lane Signal Installation**

- *This location is not in the CIP, and will need to be signalized in the future with the advent of the Dorsey Drive interchange. Once Dorsey Drive volumes increase with the opening of the interchange, a signal must be in place to accommodate project traffic (Year 2008).*

Since these intersections are not part of the regional mitigation fee program, the cost of mitigation would be sustained by any future development of the SNMH 18 ac Master Plan.



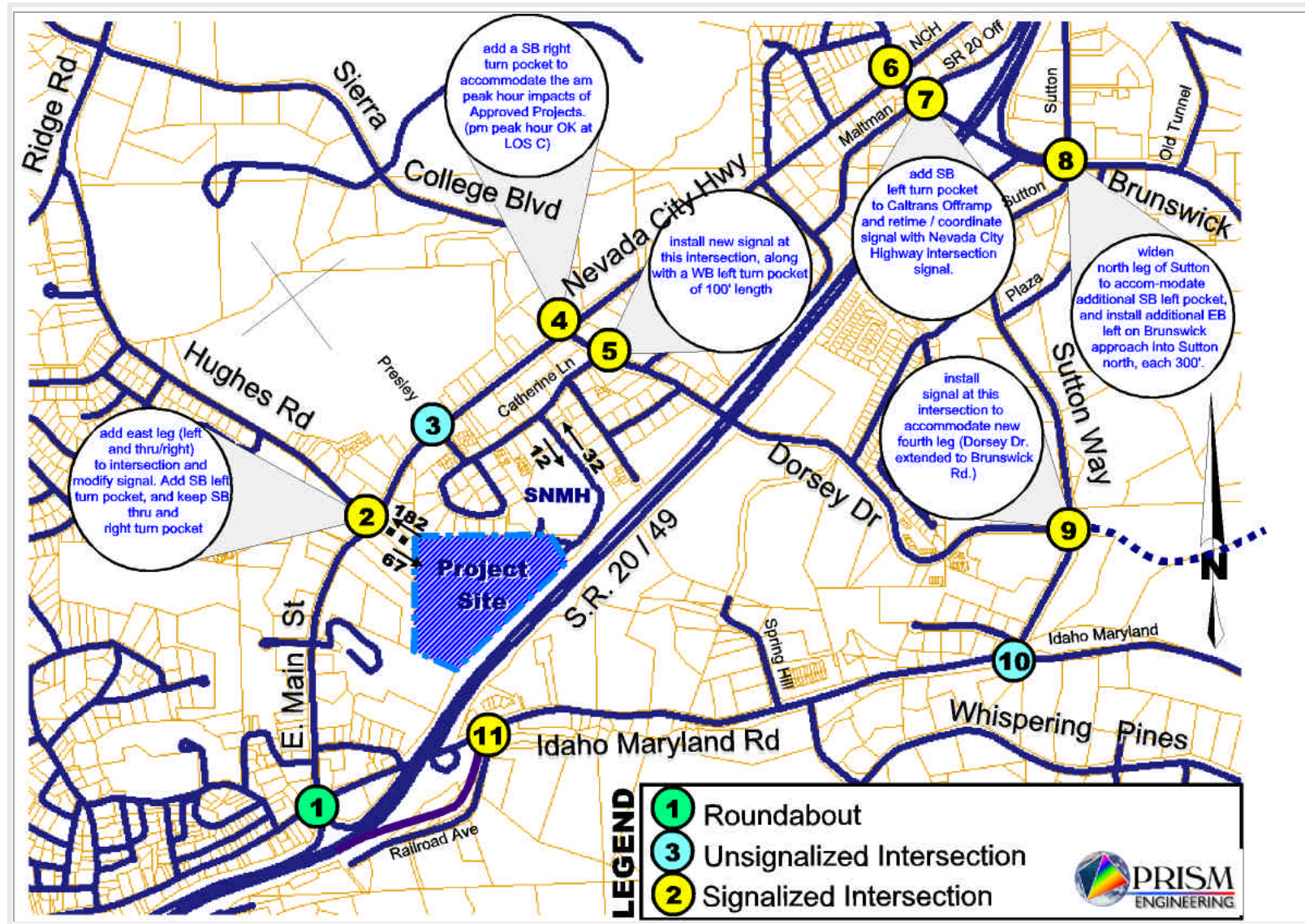


Figure ES.2 Intersection Mitigations for Year 2027 Conditions + SNMH Master Plan



Sierra Nevada Memorial Hospital 18 ac Master Plan

DESCRIPTION

The SNMH 18 ac Master Plan calls for local development of outpatient imaging and women's center facilities. It will consist of 80,000 square feet of new development (20,000 square feet and 32 employees for proposed project, plus 60,000 square feet of potential expansion with an additional 96 employees +/-) on 18 acres of land in addition to the SNMH hospital facilities that already exist at this location (see Figure 1).



The Master Plan expansion project may be built in phases, specifically as follows:



- Proposed Project
 - 1 story building with 20,000 sq ft (shown as building in middle)
- 18 ac Master Plan Potential
 - 2 story building with 40,000 sq ft
 - 1 story building with 20,000 sq ft

Ultimately, the new road will connect an expanded parking lot (300 space +/- parking lot) serving the three new buildings, to East Main Street at the existing signalized Hughes Road intersection. This new road will traverse southwesterly meandering down the slope, creating a new connection to the hospital site, and will connect to the existing perimeter road around the existing hospital facilities (creating a continuous ring road around the total existing and future hospital facilities).

Trip Generation and Distribution

Table 5 documents the trip generation rate utilized for the development of the SNMH 18 ac Master Plan. Trips are based on ITE national averages for similar type facilities as the project, and averaged as explained in the Trip Generation section of this report. The peak hour trip rates listed in the table represent the amount of traffic that is expected to take place to and from the project site during the adjacent street peak hour (4:30 to 5:30 pm). The am peak hour is also shown in the table for comparative purposes; however, an am peak hour analysis was not included in this study. The pm peak hour impact is significantly higher than the am peak hour (216 pm peak hour trips versus 132 am peak hour trips). For this reason, the pm peak hour is the focus of this report's analysis. During the pm peak hour, the average trip rate from the ITE Trip Generation Manual, 6th edition, is 3.66 trips per thousand square feet (KSF) and 1.06 trips per employee (EMP). Both independent variables for the project are known, and the trip generation was calculated using the *average* of these two calculations as can be seen in Table 5. Since there is 80,000 square feet (80 KSF) of medical office facilities ultimately planned (132 employees+/-) in the Master Plan, this would correlate to a total of 216 pm peak hour trips, with 60 inbound trips during that hour, and 156 outbound trips during the same time period.

For the future conditions (Year 2027), the SNMP 18 ac Master Plan project traffic was assigned to the street network without the Dorsey Drive interchange in place, and was also reassigned to take advantage of the future Dorsey Drive interchange. SNMH Master Plan traffic was added directly to the NCTC's Year 2027 adjusted traffic model output for each of



the 11 study intersections. The trip distribution percentages utilized for the Year 2027 scenario are given in Figures 9 and 10.



Table 5
Trip Generation, SNMH 18 ac Master Plan (80,000 square feet)

Medical Offices Expansion Summary						
AM PEAK HOUR (one hour between 7 and 9 am)						
ITE Code	Land Use	AM Peak Rate	Quantity	AM Peak Trips	AM Trips IN	AM Trips OUT
720	AM Rate for Medical Office in ITE Trip Generation Manual	2.43 trips / KSF	80 KSF	196	156	40
		0.53 trips / EMP	128 employees	68	52	16
AVERAGE TRIPS>>				132	104	28
PM PEAK HOUR (one hour between 4 and 6 pm)						
ITE Code	Land Use	PM Peak Rate	Quantity	PM Peak Trips	PM Trips IN	PM Trips OUT
720	PM Rate for Medical Office in ITE Trip Generation Manual	3.66 trips / KSF	80 KSF	292	80	212
		1.06 trips / EMP	128 employees	136	36	100
AVERAGE TRIPS>>				216	60	156
DAILY TRIP TOTALS						
ITE Code	Land Use	Daily Rate	Quantity	Daily Trips	Daily Trips IN	Daily Trips OUT
720	Daily Rate for Medical Office in ITE Trip Generation Manual	36.13 trips / KSF	80 KSF	2890	1445	1445
		8.91 trips / EMP	128 employees	1141	570	570
AVERAGE TRIPS>>				2016	1008	1008



Source: ITE Trip Generation Manual and PRISM Engineering

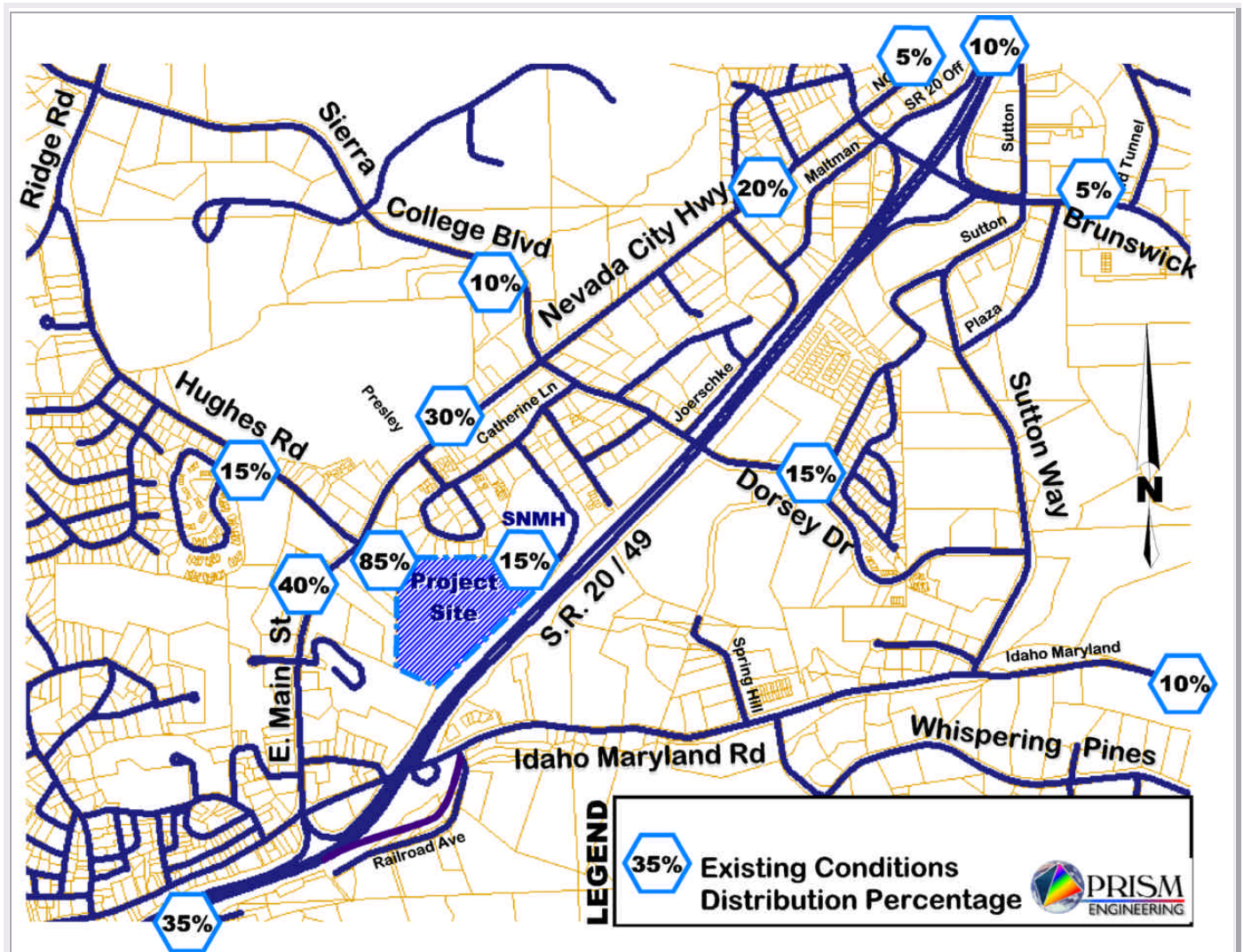


Figure 9 Trip Distribution of Master Plan, No Dorsey Drive Interchange

The differences in the trip distribution pattern between Figures 9 and 10 are primarily related to the installation / construction of the planned Dorsey Drive interchange. 20% of the project traffic was reassigned to access the freeway system through this interchange, and reductions in traffic (traffic pattern shifts) would take place elsewhere. This analysis shows the benefit of the Dorsey Drive interchange to any future Master Plan traffic impacts. Specifically, the Idaho Maryland interchange usage was decreased 10% (down from 35% to 25%), and the Brunswick Basin interchange usage was



also decreased 10% to account for the shift of traffic to use the future Dorsey Drive interchange. This shifting of future traffic as well as the shifting of project volumes results in a mitigating of traffic volumes for the future condition. The Nevada City Highway / Brunswick Road intersection went from LOS E to LOS D in the future with this reduction.

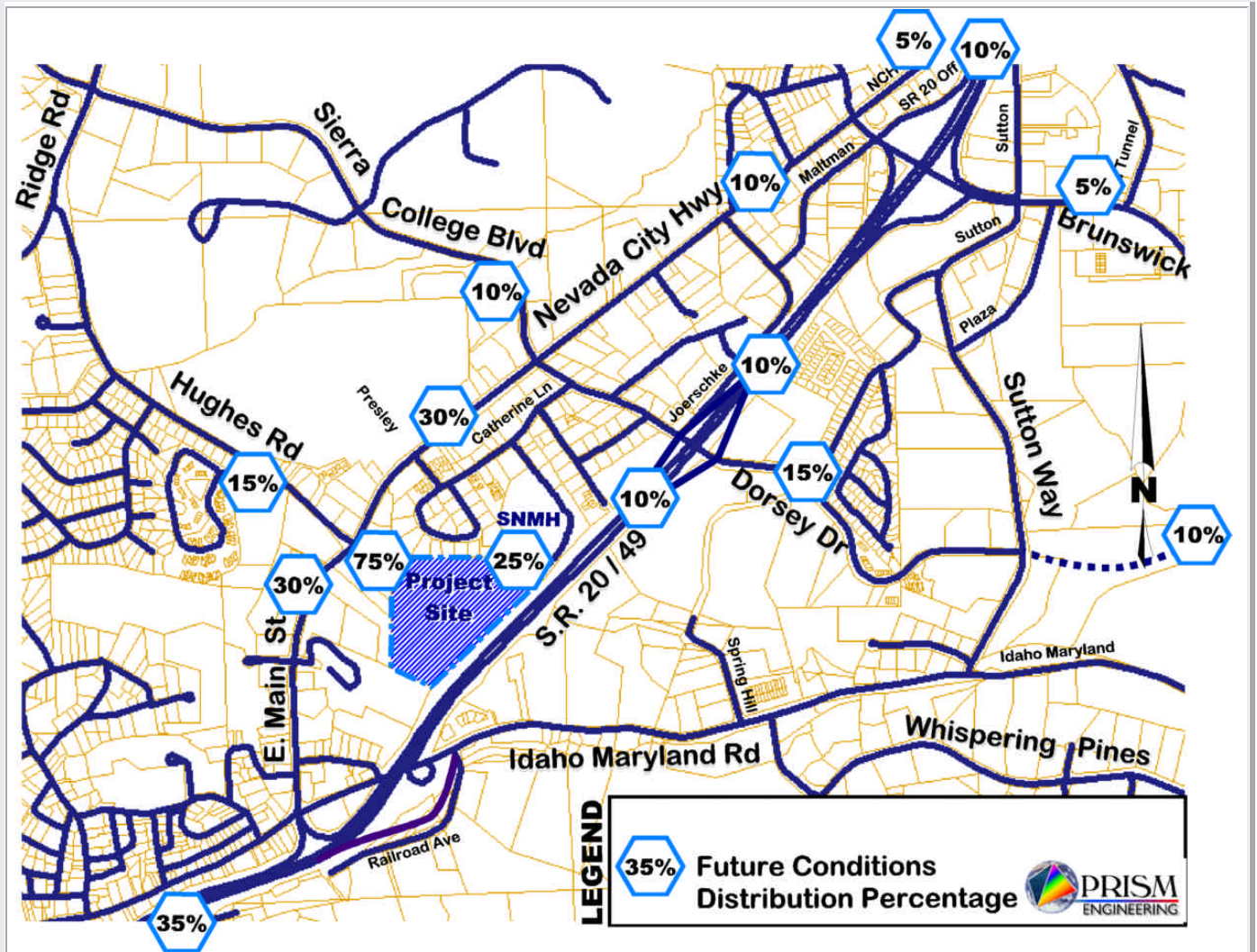


Figure 10 Trip Distribution of Master Plan, 2027 PM Peak Hour w/Dorsey



ANALYSES

Existing + total SNMH 18 ac Master Plan Project Conditions Analysis

Figure 11 shows the study area intersections and how the project traffic was assigned using the distribution shown in Figure 4B for the SNMH Master Plan project traffic totals. The project traffic was internally distributed to favor use of the new connector road extending Hughes Road from East Main Street into the proposed 18 acre project site. This new road makes access to East Main Street much more convenient (when compared to the Presley Way unsignalized intersection). 85% of the project traffic was assigned to the new Hughes Road intersection, and the remaining 15% was sent to Catherine Lane to access Dorsey Drive (as depicted in Figure 11 for the immediate short term scenario).

Although the project would add a significant amount of traffic to the existing Hughes Road / East Main Street intersection, the intersection can be mitigated to overcome these impacts, and no widening of East Main Street is necessary.

A capacity analysis for signalized intersections was performed for the following scenarios consistent with CEQA guidelines and typical comparative scenarios:

- Year 2002 plus Approved Projects plus SNMH Master Plan Project (80,000 sq ft)
- Year 2027
- Year 2027 plus total SNMH Master Plan Project (80,000 sq ft)

Reference is again made to Table 3 which summarizes level of service delay criteria for both signalized or unsignalized intersections.



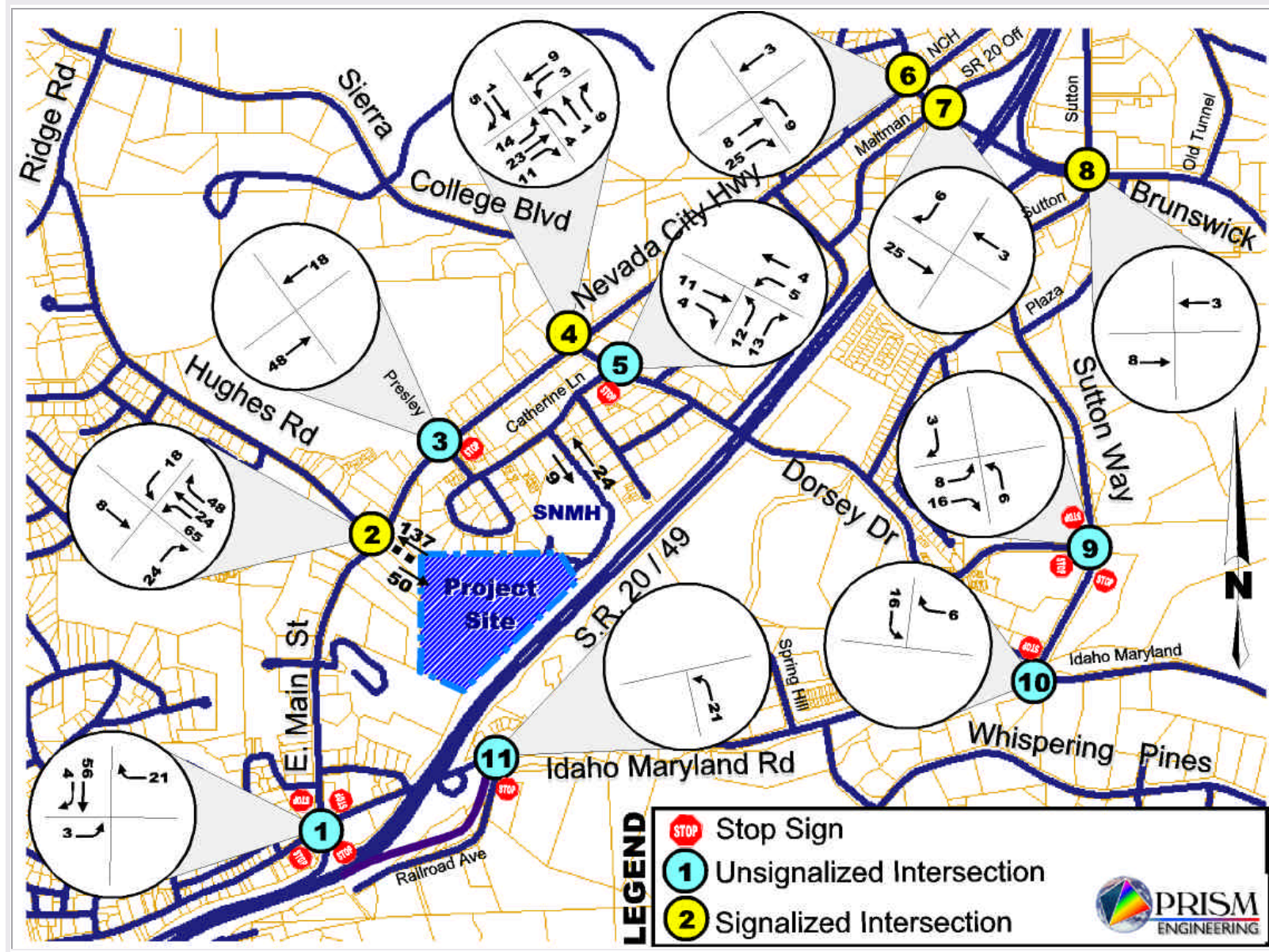


Figure 11 SNMH Master Plan Project Traffic, PM Peak Hour, No Dorsey Interchange



Capacity Analysis Results

The details of the results for the Year 2002 and the Year 2027 analyses scenarios are summarized in Table 6 and Table 7, respectively.

As can be seen from Table 6, several locations (five) are currently operating at LOS E or F conditions (using the Highway Capacity Manual (HCM) methodologies). It should be noted that while the HCM reports a very conservative rank for LOS, it is possible to mitigate specific intersection LOS with proper signal timing, if a signal is installed. The LOS ranking shown in each of the tables are based on the HCM delay criteria summarized in Table 3.

Table 6 reports the existing plus Master Plan scenarios, and shows that according to the HCM analysis methods, five intersections are currently operating at LOS E/F conditions. This means that mitigation at these intersections is a priority as development projects come on line.

The future Year 2027 conditions were determined using the NCTC's current traffic model, with some minor adjustments to account for maintaining at least existing traffic volumes for some turning movements. The SNMH Master Plan project traffic totals were manually added to the Year 2027 adjusted projections¹ so that the volumes in all LOS calculations are the Year 2027 + Project. Table 7 summarizes these levels of service for the future scenarios using total traffic projections for the SNMH 18 ac Master Plan.

¹ (adjustments were made to some Year 2027 projections to ensure that the future volumes were at least as large as the existing volumes (the model out of necessity has macro sized traffic zones, significantly aggregating parcels of land, and may not precisely replicate existing traffic conditions at the intersection turning movement level)



Table 6
Intersection Level of Service Analyses Summary for
Year 2002 PM Peak Hour 18 ac Master Plan Scenarios

		2002 + AP +				MITIGATED				
No.	Intersection Street Names	2002		2002 + AP		total Master Plan		2002+AP+Master Plan		Mitigation Detail
		P.M. Peak Hour		P.M. Peak Hour		P.M. Peak Hour		P.M. Peak Hour		
		Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	
1	E. Main Street and Idaho Maryland Rd	66	F	69	F	83	F	13	B	Roundabout, 144' diam
2	E. Main Street and Hughes Rd	18	C	18	C	24	D			
3	East Main Street and Presley Way	4	A	4	A	11	B			
4	East Main Street and Sierra College Blvd	20	C	22	C	22	C			
5	Dorsey Drive and Catherine Lane	12	B	12	B	13	B			
6	Nevada City Highway and Brunswick Rd	69	E	69	E	69	E			add WB Left add SB Dual Left and add WB Left
7	Brunswick Rd and SR 20/49 WB Offramp	96	F	99	F	102	F	70	E	
8	Brunswick Rd and Sutton Way	84	F	94	F	94	F	77	E	
9	Dorsey Drive and Sutton Way	11	B	13	B	13	B			
10	Idaho Maryland Rd and Sutton Way	11	B	13	B	16	C			
11	Idaho Maryland Rd and SR 20 EB Offramp	137	F	139	F	165	F	12	B	install new Signal

¹Average delay per vehicle in seconds

LOS = Level of service

Source: SynchroPro Software output, based on City's traffic volumes and projections (see appendix)



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Table 7
Intersection Level of Service Analyses Summary for
Year 2027 PM Peak Hour 18 ac Master Plan Scenarios

MITIGATED								
No.	Intersection Street Names	2027		2027 + Master Plan		2027 + Master Plan		Mitigation Detail
		P.M. Peak Hour		P.M. Peak Hour		P.M. Peak Hour		
		Delay¹	LOS	Delay¹	LOS	Delay¹	LOS	
1	E. Main Street and Idaho Maryland Rd	263	F	284	F	20	C	install Roundabout, 144' diam.
2	E. Main Street and Hughes Rd	26	C	112	F	53	D	widen to add SB E.Main Left build WB Hughes Left & Thru/Rt
3	East Main Street and Presley Way	22	C	28	D			
4	East Main Street and Sierra College Blvd	28	C	31	C			
5	Dorsey Drive and Catherine Lane	48	E	54	F	24	C	install new Signal and WB Dorsey Left
6	Nevada City Highway and Brunswick Rd	47	D	50	D			
7	Brunswick Rd and SR 20/49 WB Offramp	97	F	99	F	71	E	add WB Offramp Left
8	Brunswick Rd and Sutton Way	137	F	137	F	70	E	add EB Brunswick Dual Left and add WB Sutton Left
9	Dorsey Drive and Sutton Way	62	F	65	F	10	A	install new Signal
10	Idaho Maryland Rd and Sutton Way	8	A	13	B			
11	Idaho Maryland Rd and SR 20 EB Offramp	42	E	67	F	19	B	install new Signal

¹Average delay per vehicle in seconds

LOS = Level of service



Source: SynchroPro Software output, based on City's traffic volumes and projections (see appendix)..



Mitigations

Since two of the study intersections would need to be mitigated with the initial Project (20,000 square feet of 18 ac Master Plan development), this section describes the mitigations that would be needed in the future for the street system. Several future mitigations are needed to bring the street network up to satisfactory levels of service with the impacts of all future development as well as the potential impacts of the SNMH 18 ac Master Plan traffic.

Any future impacts by the SNMH 18 ac Master Plan, if developed in the future, can be mitigated by participation in the regional mitigation fee program. This program calls for a certain dollar amount commensurate with traffic projections from a project to be paid into a fund before building permits are issued. The current mitigation fee is approximately \$527 per calculated trip in Zone 8 (where the SNMH resides). Based on this fee multiplied by the number of projected pm peak hour trips from the total SNMH Master Plan (216 trips), the "fair share" cost would be \$113,832 if all 80,000 square feet are constructed in the future.

- **Brunswick Road and Nevada City Highway**

- *This location will be mitigated to LOS D in the future by reduced volumes due to Dorsey Drive interchange installation. No short term mitigation is needed, as Dorsey is expected to mitigate this location.*

- **Brunswick Road and SR 20/49 WB Ramps / Maltman**

- *This location is currently in the CIP fee program (\$300k). SNMH Master Plan, when and if developed in the future, to pay fair share into regional mitigation fee program.*

- **Brunswick Road and Sutton Way**

- *This location has recently been identified for improvement in the Brunswick Corridor Study, but is not currently in the CIP fee program. SNMH Master Plan, when and if developed in the future, to pay fair share into regional mitigation fee program.*

Each of these locations are currently operating in the LOS E-F range during the pm peak hour time period. The locations and needed mitigations are shown on Figure 12. Development of the remaining SNMH Master Plan will add impact to these locations, further aggravating the condition. Several mitigations have already been identified for these locations in previous traffic studies, so that for these locations, any future development of the SNMH



Master Plan would need to pay its fair share to the Regional Mitigation Fee program.

In addition, development of the entire SNMH 18 ac Master Plan would need to mitigate two other local intersections as follows:

- **East Main Street and Hughes Road Intersection Expansion**

- *This location is not in the CIP, and will need to be modified to accommodate a new road (westbound approach) extending Hughes Road into the project site. In addition, the southbound approach's two lanes need to be expanded to three lanes (modified from a thru and a right, to a left and a thru and a right installed with construction of entire SNMH Master Plan.*

- **Dorsey Drive and Catherine Lane Signal Installation**

- *This location is not in the CIP, and will need to be signalized in the future with the advent of the Dorsey Drive interchange. Once Dorsey Drive volumes increase with the opening of the interchange, a signal must be in place to accommodate project traffic (Year 2008).*

Since these intersections are not part of the regional mitigation fee program, the cost of mitigation would be sustained by any future development of the SNMH 18 ac Master Plan.



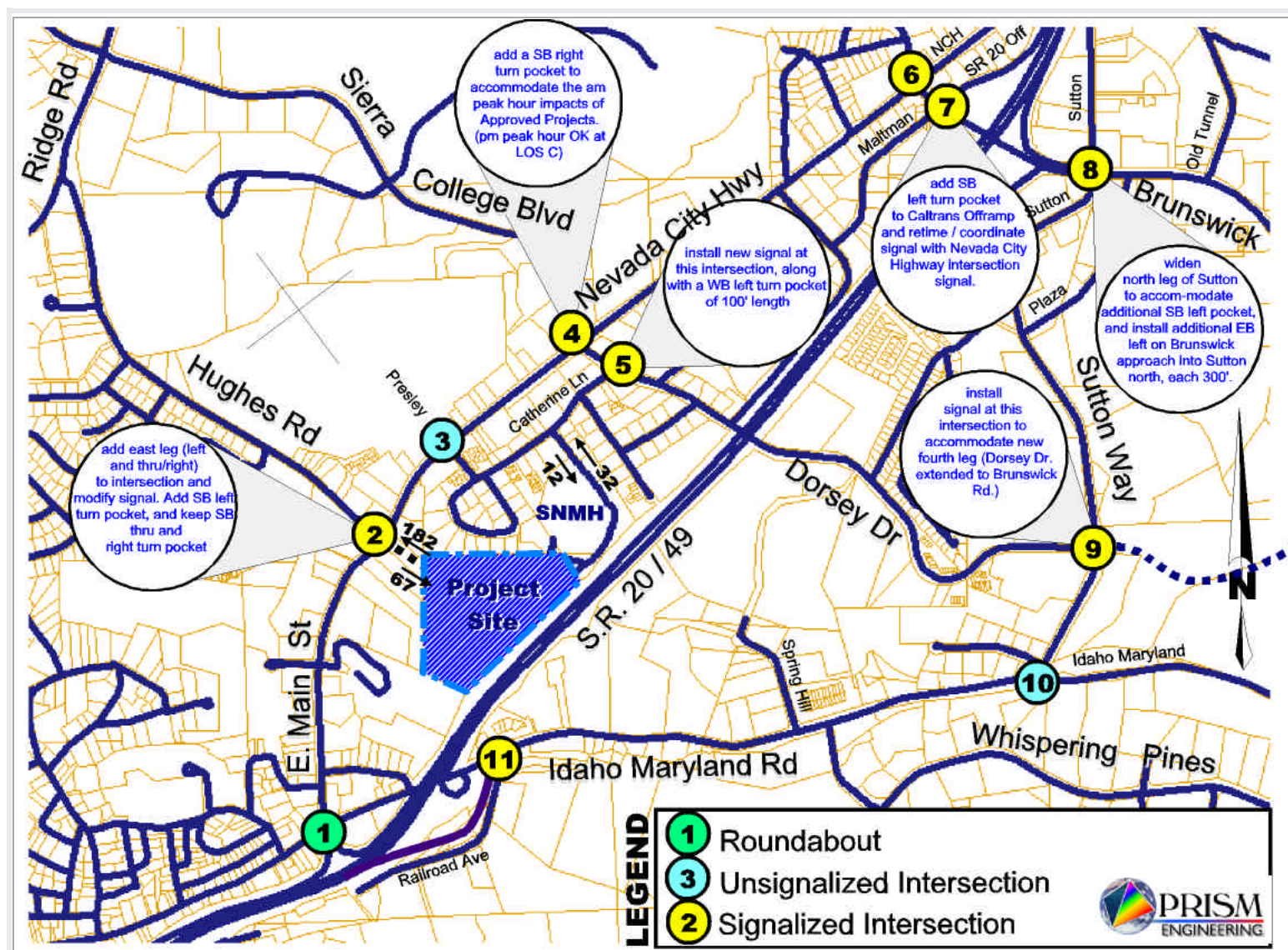


Figure 12 Mitigation Summary for Year 2027, and SNMH 18 ac Master Plan



Appendix, Input Data and Sample Calculations

